Swimming pool heat pump

Directions for installation and maintenance

CE

contents

1. **Introduction** *p3*

2. **Caution**.....*p3*

3. **Delivery control** *p4*

4. **Technical description** *p4*
   - **Technical characteristics**
   - **Outside**
   - **Inside**
   - **BP-85HS-A explored view**
   - **Wire control operation**
   - **General diagram of the refrigerating circuit**
   - **Safety and control systems**
   - **Electric diagram**

5. **Installation** *p14*
   - **Rules of installation**
   - **Hydraulic connections**
   - **Electric connections**
   - **Procedure of use**

6. **Water flow and refrigerating circuit pressure**.....*p18*

7. **Defrosting** *p19*

8. **Environment problem** *p19*

9. **Error messages and what to do** *p20*

1- Introduction

We thank you for having chosen our Heat pump.

This installation and maintenance notice contains the necessary information to its installation (delivery control, the installation, the connections) and to its repair. It is a complementary document to the user's manual which describes its instructions for use.
We invite you to read it first.

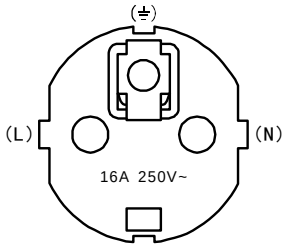
2- Caution

This document is an integral part of the product and it must stays in the technical room.

This Heat pump is exclusively for heating swimming pools.
Any other use not in conformity and random will be considered as dangerous and unsuitable.

The assembly, the electric connection and the start up must be carried out by specialized and professional person.

When connect plug to socket (power supply), please make sure that live wire, neutral wire, earth wire to plug should be connected as right drawing.



It is essential to maintain the temperature in the swimming pool lower than the recommended value by the swimming pool's manufacturer.

Please make sure that minimum water flow speed is 4.5m^3/h.

In a concern to a constant improvement, our products can be modified without notice; the present pictures in this note or the characteristics which are described are not contractual.

3- Delivery's control

At the delivery time, check the condition of packing; in case of damages, have reservation about them to the carrier, before 48 hours and by registered letter with acknowledged receipt.

Before any manipulation, check the complete state of the machine.

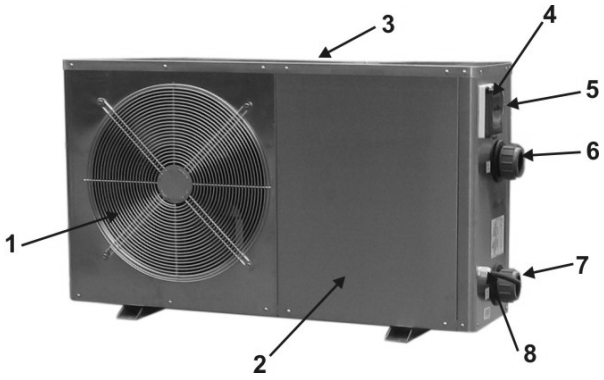
4- Technical description

Characteristics:

MODEL	**BP-85HS-A**
Power supply	*230V~, 50Hz*
Heating consumption power * (kW)	*1.7*
Heating restored power *(kW)	*8.5*
Heating nominal intensity *(A)	*7.9*
Cooling absorptive power * (kW)	*1.7*
Cooling restored power *(kW)	*6.8*
Cooling nominal intensity *(A)	*7.9*
Air flow (m^3/H)	*2000*
Noise level (d(B)A)	*<52*
Refrigerant gas	*R410a*
Rate of average filling of gas (g)	*950*
Net weight of the unit (kg)	*52*
Overall sizes L x W x H (cm)	*93 x 28 x 55*

***** Possible variations of value according to climatic conditions**

Outside:

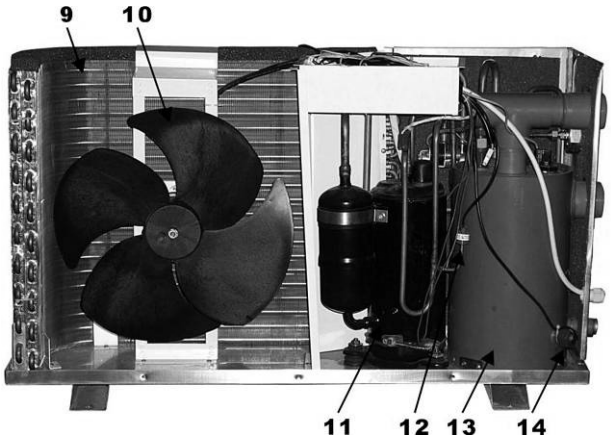


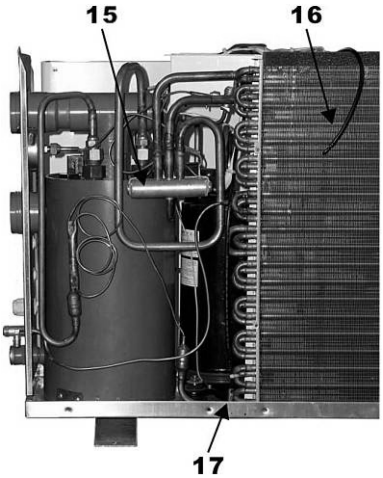
1	Fan protection grid
2	Front panel
3	Top cover
4	Control panel
5	Refrigerant pressure manometer
6	Fast connection for water outlet
7	Fast connection for water intlet
8	Wire connection for power supply

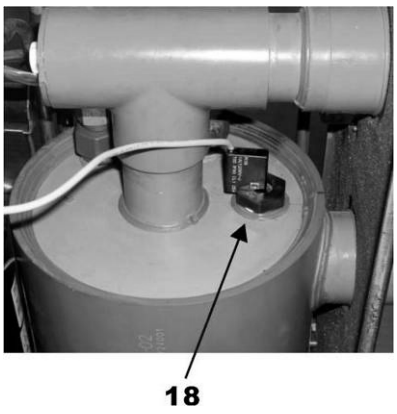
Inside:

(Front sheet cover and panel removed)

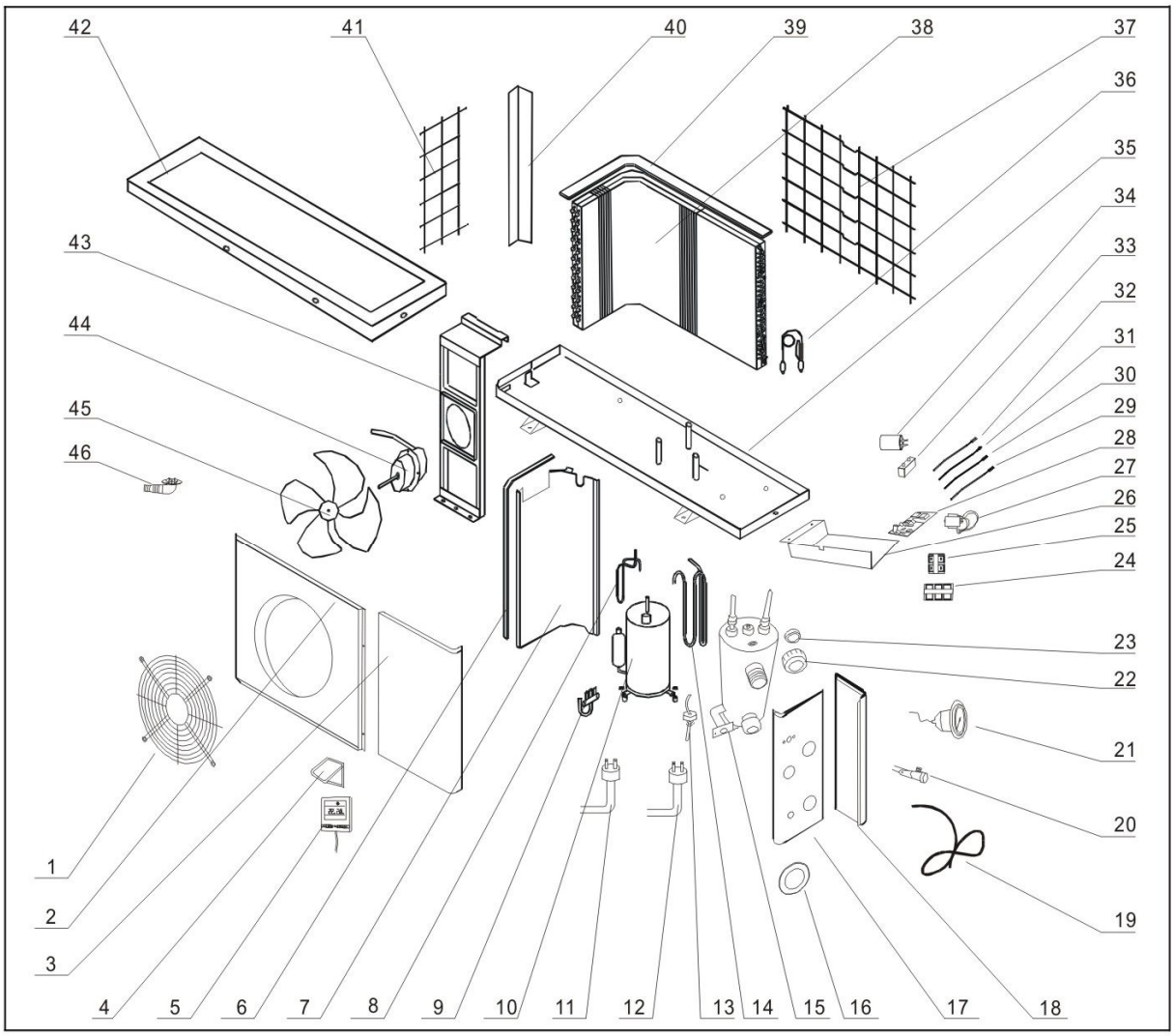
9	Evaporator
10	Fan
11	Compressor
12	High and low pressure interruptor
13	Titanium heat exchanger
14	Temperature sensor of swimming pool water
15	Four way valve
16	Ambient temperature sensor
17	Defrost sensor
18	Water flow switch







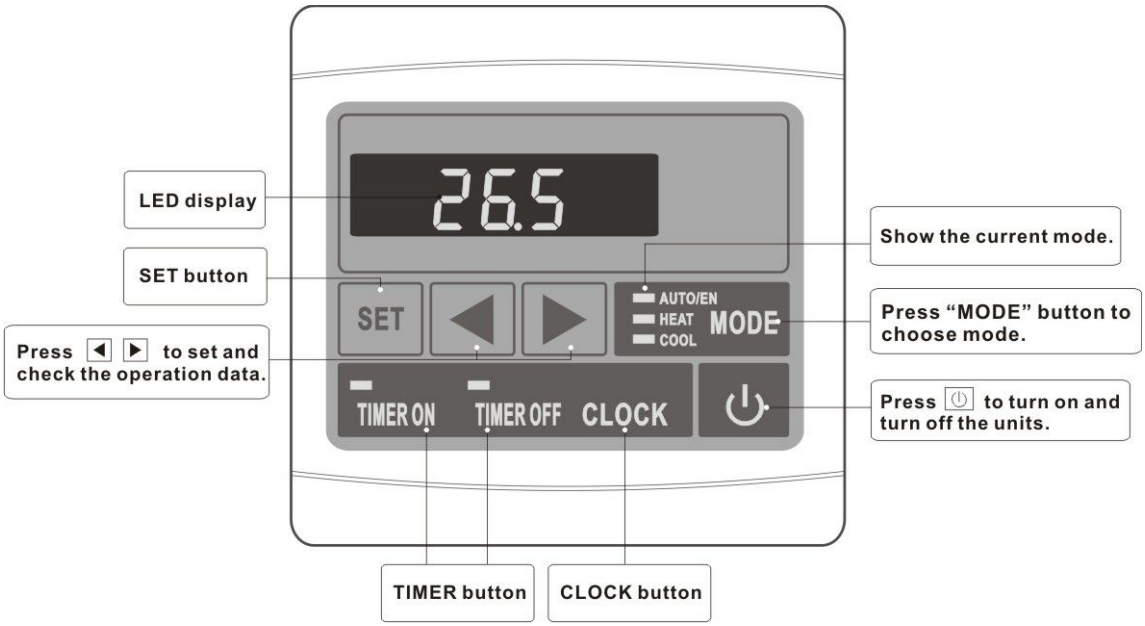
Explored view



1	Fan protection net	17	Right size board	33	Motor capacitor
2	Front panel 1	18	Right rear board	34	Compressor capacitor
3	Front panel 2	19	Power cord	35	Frame
4	Control panel cover	20	Mouth injecting gas	36	Capillary
5	Wire controller	21	Pressure manometer	37	Rear net
6	Verge board polyfoam	22	Fast connection	38	Condenser
7	Verge board	23	Gasket	39	Condenser top polyfoam
8	Exhaust pipe	24	Terminal	40	Left carriage
9	Four way valve	25	Public terminal	41	Left net
10	Compressor	26	Electrical box	42	Top cover
11	High pressure interruptor	27	Transformer	43	Motor bracket
12	Low pressure interruptor	28	Circuit board	44	Fan motor
13	Water flow switch	29	Copper sensor	45	Fan
14	Gas returning pipe	30	Water sensor	46	Drain tube
15	Titanium heat exchanger	31	Ambient sensor		
16	Rubber water fender	32	Compressor sensor		

Wire control operation

The function of the LED display and control:



Set the operation parameter:

When the unit powered up but not running, press " ◀ " or " ▶ " to enter operation parameter interface. (parameter from 0-F, see Operation Parameter Table).

◎ Press "**SET**" to enter current parameter setting, press " ◀ " or " ▶ "to set data for parameter, press "**SET**" again exit the current parameter setting.

◎ No press in 8s, it will exit the setting interface.

◎ If the heat pump is running, press " ◀ " or " ▶ " to enter operation parameter check interface, But can't change parameters (Except the parameter 0, 1, 2 for water temperature setting in different modes).

◎ If the heat pump is running, the LED display shows current water temperature;
If the heat pump is turnoff, the LED display shows current time.

NO	Meaning	Range	Change	Factory setting
0	Cooling setting water temperature	15~45°C	YES	27
1	Heating setting water temperature	15~45°C	YES	27
2	Auto mode setting water temperature	15~45°C	YES	27
3	Turnround of defrosting Under heat mode	30 ~ 90 min	YES	40 (40 min)
4	Defrosting start temperature	-30 ~ 0°C	YES	-5°C
5	Defrost exit temperature	2 ~ 30°C	YES	15°C
6	Time of exit defrost Under heat mode	0 ~ 12 min	YES	6 min
7	Low ambient temperature protection	-20~10°C	YES	-7°C
8	Compressor protection Exhaust temperature	95 ~ 110°C	YES	95°C
9	Automatic restart	0/1	YES	1
A	Mode (heat/coo & heat)	0/1	NO	1
b	Water pump mode	0/1	YES	1
C	Water temperature difference to restart	1 ~ 10°C	YES	2
d	Water temperature	-9 ~ 99°C	Measured value	
E	Compressor Exhaust temperature	-9 ~ 125°C	Measured value	
F	Copper temperature	-9 ~ 99°C	Measured value	
H	Ambient temperature	-9 ~ 99°C	Measured value	

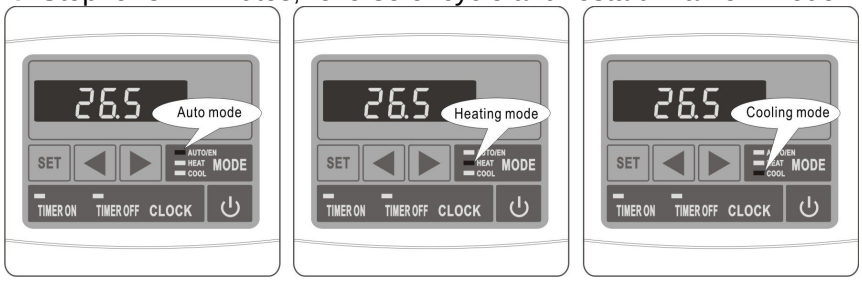
Choose the operation mode:

◎ Press " ⏻ " to power on unit. Under running, the LED displays the water temperature and current mode.

◎ Press "**MODE**" to choose mode(mode can be changed under running)

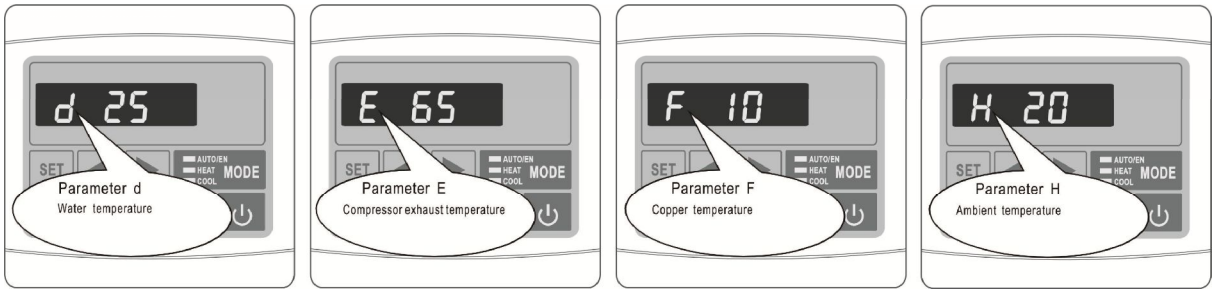
◎ Press " ◀ " or " ▶ " to enter operation parameter check interface, Select the current mode water temperature setting parameters, press "**SET**" button to enter, press " ◀ " or " ▶ " set required tempreature.

◎ Stop for 3-4 minutes, reverse of cycle and restart in a new mode.



Check current temperature:

◎Under running, press " ◀ " or " ▶ " to check the current status of the unit. You can check water/ambient/compressor/copper temperature.



Setting the time

press "**CLOCK**" botton to set the time. The time displayed blinks, press "**CLOCK**" botton again and then use the arrow " ◀ " and " ▶ " to change the hour setting. To change the minutes, press "**CLOCK**" botton again. Once the correct time is set. press "**CLOCK**" botton again the end. The display returns to normal after 8 seconds.

Timer switch ON and Timer switch OFF:

Once the time has been set correctly, this function allows a machine start time and a machine stop time to be programmedduring the day.

Press "**TIMER ON**" botton the time displayed and "ON" to blink, press "**TIMER ON**" botton again Change the hour using the " ◀ " and " ▶ " keys. Press "**TIMER ON**" botton again to change the minutes using the " ◀ " and " ▶ " keys. Press "**TIMER ON**" botton again the end.

Press "**TIMER OFF**" botton the time displayed and "OFF" to blink, press "**TIMER OFF**" botton again Change the hour using the " ◀ " and " ▶ " keys. Press "**TIMER OFF**" botton again to change the minutes using the " ◀ " and " ▶ " keys. Press "**TIMER OFF**" botton again the end.

The time setting is from 0 to 24 hours to recycle.

When the setting time for on and off is the same,the setting time is not available.

When the setting timer, Press "**CLOCK**" to deactivate TIMER.

Coercive Defrosting (Only on heating mode):

1. Press "**MODE**" 10 seconds when the unit is running, the unit will go into coercive defrosting function.
2. When it arrives in defrosting exit criteria, defrosting is stopped.
3. After exiting the defrosting, the unit will stop 30 seconds, then it will heat water again.

Key lock:

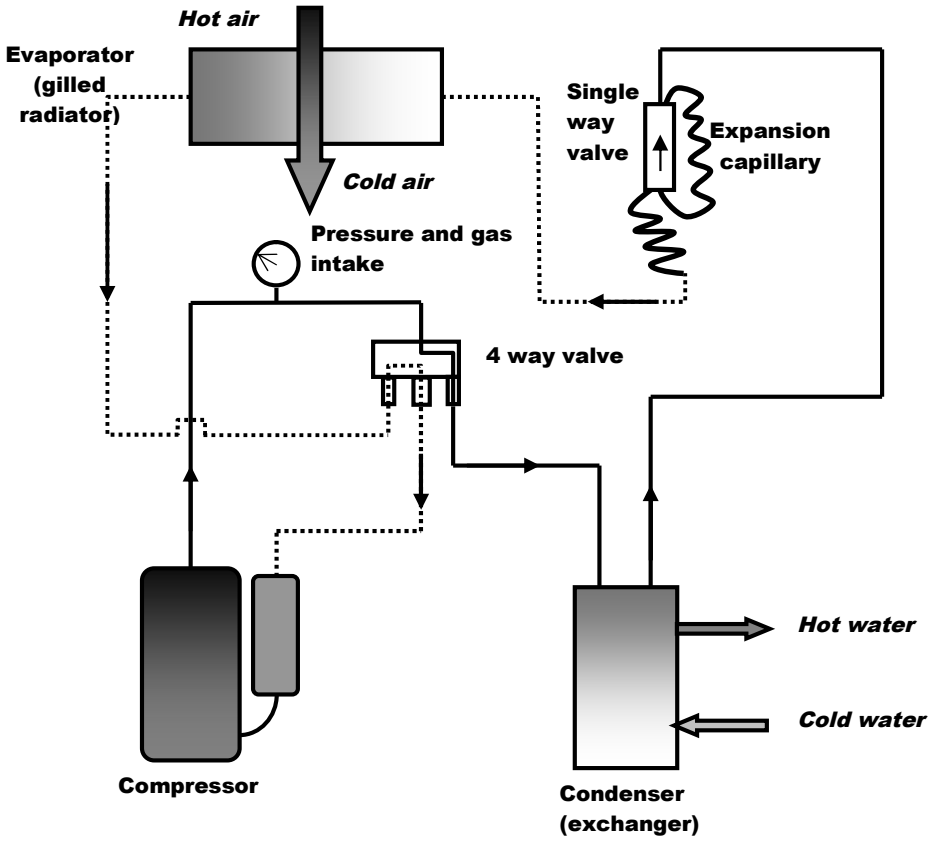
Press "**SET**" and " ◀ " 5 seconds to set keylock.
Press "**SET**" and " ◀ " 5 seconds again to release keylock.

General diagram of the refrigerating circuit

The heat pump is reversible allowing the swimming-pool's heating or cooling:

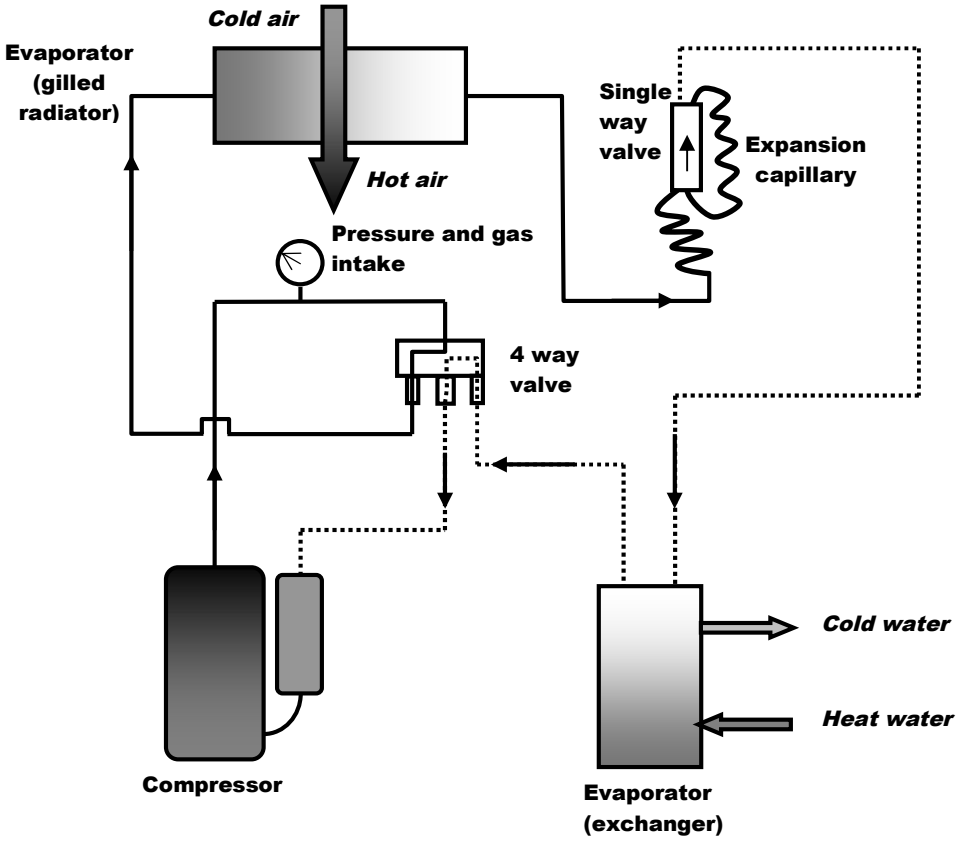
Swimming-pool water's heating mode:

The cold and liquid refrigerant fluid absorbs the heat contained in the air through the evaporator (gilled radiator), in which it is vaporizing; it is then put up in pressure and in temperature by the compressor which sends it in the condenser (exchanger) where it loses its heat (in giving it to the water of swimming pool) and comes back in liquid state; it loses its pressure and still cools in the expansion capillaries before turning back to the evaporator for a new cycle.



Swimming-pool water's cooling mode:

The 4 way valve reverses the circulation of the refrigerant fluid; the fluid vaporizes in the exchanger (evaporator) in getting the heat of the water, goes through in the compressor which reheats it and through in the gilled radiator (which becomes condenser) where it comes back to liquid state.



Safety and control systems

The heat pump is fitted out:

Temperature control:

- **A temperature sensor of the evaporator, starting the defrosting operation.**
- **An ambient temperature sensor ensuring the cut of the heat pump when the temperature of the external air goes down under -7°C (factory settings). The normal cycle restarts when the outside temperature goes up to -5C (factory settings).**
- **A temperature sensor placed on the exchanger, ensuring the cut of the heat pump when the temperature of the water reaches the required temperature. The normal cycle restarts when the temperature in the exchanger goes down to a temperature lower of 2°C (factory settings) than this required.**

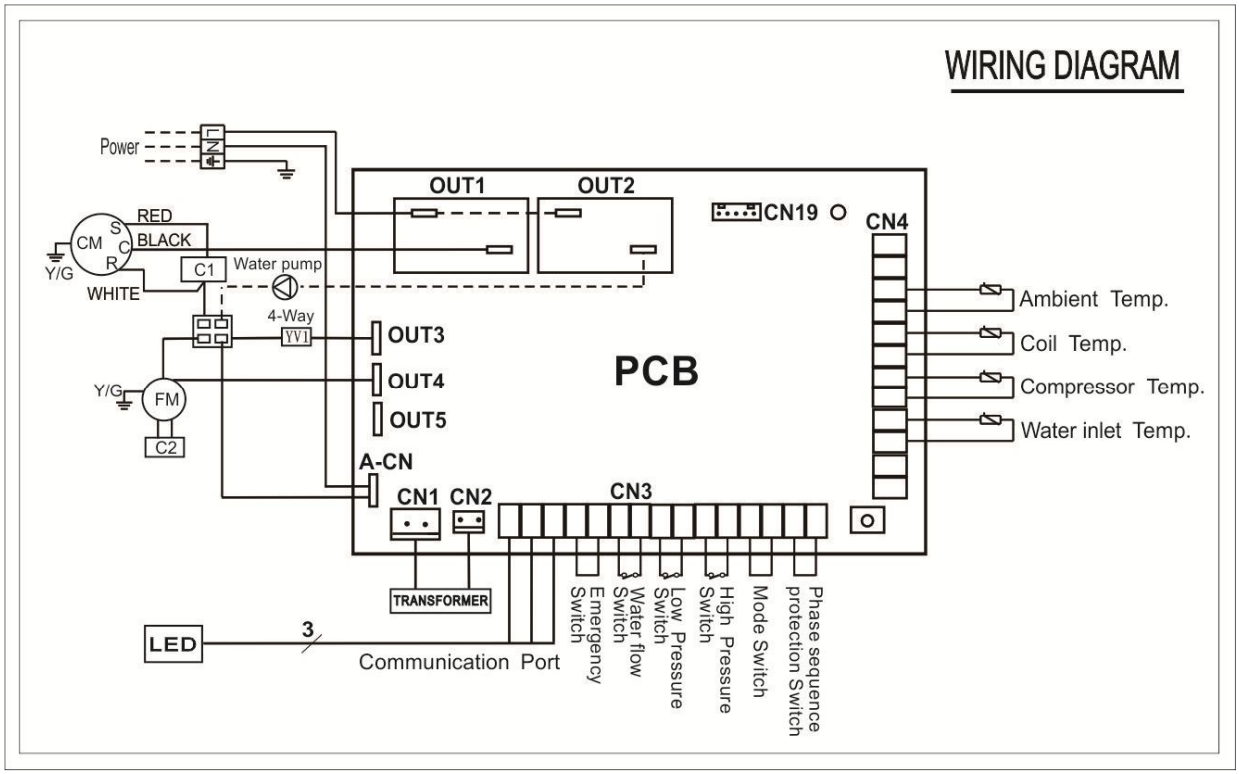
With 4 safety systems:

- **A water flow detector placed at the exit of the exchanger**
- **A high pressure gas circuit breaker, a low pressure gas circuit breaker**
- **An outlet compressor temperature sensor**

If a defect occurs on one of these systems (defective system, off-line or abnormal measured value) a message of defect appears on the display screen; see the paragraph "Error codes and what to do" of this note.

<u>Caution</u>: the removal or the shunt of one of the control or safety systems involves the cancellation of the guarantee.

Electric diagram



5- Installation

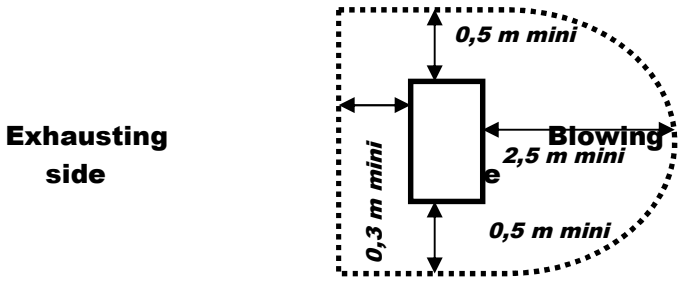
Rules of installation:

Electric and hydraulic connections must be carried out according to standards in effect (NF C 15 100, CE I 364).

The machine must be installed outside.

The machine must be posed on its ant vibratory studs, set and lying flat and on a massive base (concrete slab); this base must have a sufficient height to prevent any entry of water by the bottom of the machine. Height must be adjusted to fit the connector collecting the condensates.

The obstacles such as wall and vegetation must be separated from the machine as indicated on the diagram below.



Do not to install the Heat pump in a confined place (the fan would recycle its air and the Heat pump would be down performance).

The fan should not blow towards the windows or crossing point.

Safety distance between the swimming pool and the foot bath: the fitter must imperatively refer to the standard C15-100 section 702; the machine should not be installed in volume 1 surrounding the swimming pool but at least in volume 2 so at a distance of 3 m minimum of the swimming pool and foot bath.

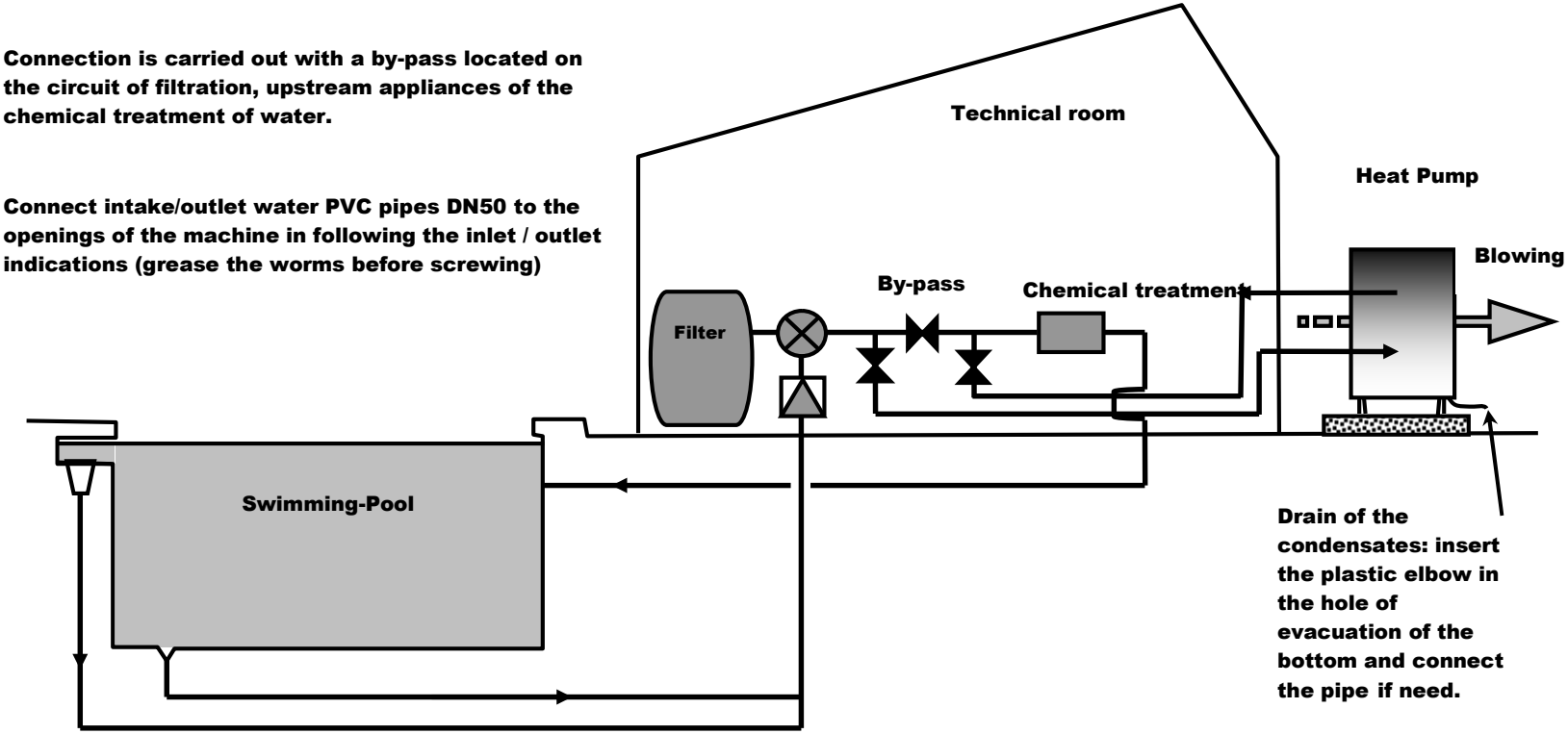
Other precautions of installation:

- Do not to install the machine near a way with circulation of car in order to avoid mud projections.
- Avoid directing blowing against dominant winds.
- If the machine is intended to be used in winter, put it in a place protected from the falls of snow.
- The machine must be able to be supervised in order that children do not play around

Hydraulic connections: To respect imperatively

Connection is carried out with a by-pass located on the circuit of filtration, upstream appliances of the chemical treatment of water.

Connect intake/outlet water PVC pipes DN50 to the openings of the machine in following the inlet / outlet indications (grease the worms before screwing)


Technical room
Heat Pump
Blowing
By-pass
Chemical treatment
Filter
Swimming-Pool
Drain of the condensates: insert the plastic elbow in the hole of evacuation of the bottom and connect the pipe if need.

Electric connections:

CAUTION: before connecting the machine, make sure that the feeder is disconnected to the electrical network.

The electric installation must be carried out by an experienced electrician and the supply must come from a severing equipment and differential protection; the whole must be carried out according to standards' in force in the country where the material is installed.

Characteristics of the electric supply:
- 230 V +/- 10%, single-phase current, 50 Hz
- Mode of neutral TT and TN.S; the circuit of heat pump must be connected to an earth circuit.

Characteristic minimum of the protection:
- Protection must be of 16 A, by circuit breaker or fuse; it must protect the Heat pump exclusively; the circuit breaker must be specified with curve D, the fuse must be specified Am.
- Differential protection : 30 mA (the length of cable between the connector block of the heat pump and the protection of should not exceed 12 m).

Control :

The heat pump is fitted out with a water flow detector which function is to apply the signal to the electronic card when the water flow is sufficient.

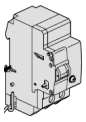
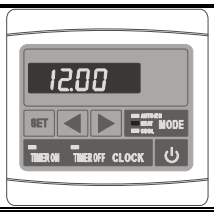
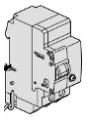
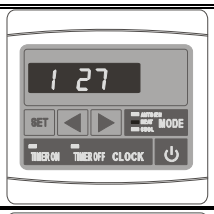
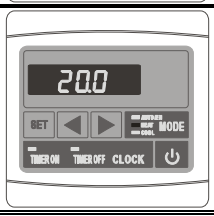
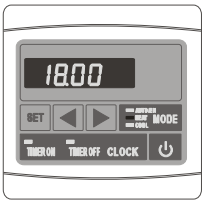
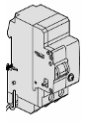
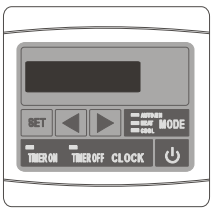
We recommend when it is possible to control the heat pump to the filtration pump (by contacting relay non supplied to insert in the feeding circuit of the heat pump).

The remmonded water flow speed is 4.5m^3/h.

Removed control panel:

An extension cord allows the removal of the panel in inserting it in a standard electric box into the technical local; the option is supplied with a cover allowing to seal the aperture let by the removal of the control panel.

Procedure of use

Action	External Appliance or Button of heat pump	Display	Heat pump answer
Put the heat pump under tension	Engage the circuit breaker of the heat pump 		Display current water temperature
Put in circulation the swimming pool water into the pipes	Engage the circuit breaker of pump of filtration 		
Chose the operation mode	Press the button **MODE**		Stop for 3-4 minutes, reverse of cycle and restart in a new mode
Set the water temperature into the swimming pool	◀ ▶, adjustable from 15°C to 40°C		The heat pump heats or cools until the required temperature (P7/P8)
Start	Press the button ⏻		Start between 1-4 minutes in the previous operation mode (heating/cooling/auto)
Stop	Press the button ⏻		Immediate stop and wait
Switch off	Use the circuit breaker of pump of filtration, and heat pump 		Complete stop

6- Water Flow and refrigerating circuit pressure

After putting into service, do the settings of pressure of the refrigerant circuit for having an optimal operating of the heat pump, following:

Stage 1:
Before starting the Heat Pump, ambient temperature around 20°C, refrigerant meter shows pressure from 14 to 16kg/cm².

Stage 2:
Close completely the by pass valve and open large inlet and outlet valves of the Heat Pump; in these conditions the totality of the water flow goes by the Heat Pump.
Put into service the Heat Pump in heating mode, wait for the indicated pressure being stabilized; the correct setting of the pressure is from 21 to 35 kg/cm²;
In most of cases (pump of filtration given a flow until 20m³/h) you do not have to open the by pass valve.
If the stabilized pressure is under 21kg/cm², the progressive opening of the by pass valve will allow rising this pressure.

The adjustment of the by pass valve done, you have in principle no reason to modify it during the season. See the paragraph "Environment problem" too.

7- Defrosting

The defrosting is necessary only in heating mode.

Sequences of the defrosting:

1- Start

The defrosting is engaged if the following conditions are at the same time fulfilled:

- the defrosting sensor temperature goes down to 15°C

- the compressor runs without stopping for 40 minutes

- the defrosting sensor temperature goes down to -7°C

2- The compressor and the fan stop

3- After 25 seconds, the 4 way valve shifts

4- After 5 seconds, the compressor starts alone and the accumulated freeze on the gills becomes melting, what is generally with a steam cloud

5- Stop:

The defrosting stops if one of the following conditions is fulfilled:

- the detected temperature by the defrost sensor goes up to 15°C.

- the compressor had run totally 6 minutes

6- The compressor stops

7- The fan start

8- After 5 seconds the 4 way valve shifts

9- After 25 seconds the compressor start for restarting in heating mode.

8 – Environment problem

Under certain external conditions the heat exchanges between the refrigerant and the water on one hand and between the fluid and the air on the other hand are insufficient; the consequence is that the refrigerating circuit runs up in pressure and the compressor consumes more electricity.

The temperature sensors compressor outlet and the magnetic circuit breaker on the compressor power supply protect the compressor from these extreme conditions; the error messages *EE 06* occur.

The condition causing this situation is as follows:

In heating mode:

- insufficient water flow:

close the by-pass valve for increasing the refrigerant exchange → water

In cooling mode:

- too important water flow: open the by pass valve for decreasing the water flow and so the exchange water → refrigerant

- insufficient air flow: be sure that the real net of condenser are not blocked.

Note: these error codes are likely to occur if temperature of swimming pool water is high and the ambient air is hot.

9 – Error codes and what to do:

This table explains the error codes caused by a defective regulating component or by a security operation.

Screen and state of the heat pump	Component	Possible	Intervention	Second reason if the intervention is without effect
PP 01 **Compressor and fan stopped**	Water temperature sensor	Sensor disconnected, non supplied or defective	Check the connections, the wires, change it or replace the electronic card	
PP 02 **Compressor and fan stopped**	compressor exhust temperature sensor	Sensor disconnected, non supplied or defective	Check the connections, the wires, change it or replace the electronic card	
PP 03 The heat pump continues running	Defrost sensor	The defrosting is incomplete and the automatism decides to stop the heat pump	Increase lightly the water flow going into the heat pump; the effect is to increase the temperature of the refrigerant in the evaporator.	
PP 05 **The heat pump continues running**	Ambient air temperature sensor	Sensor disconnected, non supplied or defective	Check the connections, the wires, change it or replace the electronic card	
PP 07	First anti-frost protection active	Low temperatures for water and air	No action required	
PP 07	Second anti-frost protection active	Low temperatures for water and air	No action required	
EE 01 **Compressor and fan stopped**	High pressure, Low pressure protection	Insufficient water flow	Check the water flow	
		Pressure switch out of order	Replace the pressure switch Have	
		Too much refrigerant gas present	the heat pump checked by a refrigeration technician	
EE 02 **Compressor and fan stopped**	Low pressure protection	Not enough refrigerant gas	Have the heat pump checked by a refrigeration technician	
		Leak in the cooling conduits	Have the heat pump checked by a refrigeration technician	
EE 03 **Compressor and fan stopped**	Flow switch	Flow switch disconnected, non supplied or defective	Check the connections, the wires, change it or replace the electronic card	
EE 04 **The unit cannot be started**	**Emergency switch**	**Emergency switch disconnected**	**Check the connections and the wires**	
EE 05 **Compressor and fan stopped**	Low ambient temperature protection	Ambient temperature is too low or protection temperature setting set too low	Check and repair.	
EE 06 **Compressor and fan stopped**	compressor exhaust temperature sensor	Compressor exhaust temperature detected up to 95°C more than 3 times in 1HR	Environment problem Refrigerant leakage Capillary is half blocked	
EE 07 **The unit cannot be started**	**Phase protection**	**Connection disconnected or wrong phase wiring**	**Check the connections** **Put phases in order**	
EE 08 **The wire control can't operated**	Wire control Communication error	Signal cable of wire Control is loose	Check the connection of signal cable	